

## Claims

[c1] *Vehicle* 102  
1. A fuel vapor recovery system for an internal combustion engine disposed in a vehicle, the vehicle having a fuel tank coupled to a fuel filler tube, the fuel vapor recovery system comprising: a carbon canister disposed in the fuel filler tube.

[c2] 102  
2. The fuel vapor recovery system of claim 1 wherein the filler tube has an inlet for receiving fuel from a supply external to the vehicle and wherein such filler tube is disposed to direct such received fuel to the fuel tank wherein said carbon canister is disposed within said fuel filler tube to enable the received fuel to contact the canister as such received fuel passes from the inlet, by, and in contact with the canister, to the fuel tank.

[c3] 102  
3. The fuel vapor recovery system of claim 1 wherein an outer surface of said carbon canister has enhanced thermal transfer surface area to increase contact area between said carbon canister and said fuel.

[c4] 103  
4. The fuel vapor recovery system of claim 1 wherein an outer surface of said carbon canister has fins.

[c5] 103  
5. The fuel vapor recovery system of claim 1 wherein said carbon canister is further comprised of a housing, activated charcoal within said housing, and conductive strips attached to an interior surface of said housing, said conductive strips being in contact with said activated charcoal.

[c6] 103  
6. The fuel vapor recovery system of claim 1 wherein said carbon canister is further comprised of a housing comprising a material having a thermal conductivity greater than 0.15 W/cm-K and activated charcoal disposed inside said housing.

[c7] 102  
7. The fuel vapor recovery system of claim 1 wherein a cross-sectional area between an outer surface of said carbon canister and an inner surface of the fuel filler tube is greater than a predetermined area.

[c8] *Atmosphere* 102  
8. The fuel vapor recovery system of claim 1, further comprising: an inlet duct coupled to said carbon canister for conducting ambient air to said carbon canister;

a valve in said air inlet duct; and  
an outlet duct coupled to said carbon canister for conducting ambient air and  
fuel vapors to the engine.

[c9] 9. The fuel vapor recovery system of claim 1 wherein said carbon canister has at

102 least one perforation for allowing fuel vapors to pass through an external  
surface of said carbon canister.

[c10] 10. The fuel vapor recovery system of claim 1 wherein said carbon canister

10 contains activated charcoal for absorbing fuel vapors.

[c11] 11. A fuel system for an internal combustion engine disposed in a vehicle,  
comprising:

102 a fuel tank disposed in the vehicle;  
102 a fuel filler tube coupled to said fuel tank; and  
a carbon canister disposed in said fuel filler tube.

[c12] 12. The fuel system of claim 11 wherein said carbon canister has at least one

102 perforation for allowing fuel vapors to pass through an external surface of said  
carbon canister.

[c13] 13. The fuel system of claim 11, further comprising:

103 an inlet duct coupled to said carbon canister for conducting ambient air to said  
carbon canister;  
a valve in said air inlet duct; and  
an outlet duct coupled to said carbon canister for conducting ambient air and  
fuel vapors to the engine.

[c14] 14. The fuel system of claim 11, further comprising: an electronic control unit  
coupled to the engine and said valve, said electronic control unit determining  
that said carbon canister should be purged and opening said valve to initiate  
pumping of said carbon canister.

[c15] 15. The fuel system of claim 11 wherein said carbon canister forms a collar  
102 around the fuel filler tube and said fuel filler tube has at least one passage  
through the carbon canister for conducting fuel to said fuel tank.

[c16] 16. A method for assembling a fuel vapor recovery system of an automotive vehicle, the fuel vapor recovery system having a carbon canister for absorbing fuel vapors, comprising:  
 ① installing the carbon canister within a fuel filler tube wherein said fuel filler tube is coupled to a vehicle fuel tank.

[c17] 17. The method of claim 16 wherein when fuel is being supplied to the through said fuel filler tube, said fuel contacts the carbon canister.

[c18] 18. The method of claim 16 wherein the carbon canister absorbs fuel vapors from said vehicle fuel tank.

[c19] 19. The method of claim 16, further comprising: coupling an air inlet duct and an outlet duct to the carbon canister wherein said ducts pass through said fuel filler tube.

[c20] 20. The method of claim 19 wherein said air inlet duct transports fresh air to the carbon canister and said outlet duct transports said fresh air mixed with desorbed fuel vapors from the carbon canister to an engine intake, said engine being disposed in the vehicle.

[c21] 21. A fuel vapor recovery system for an internal combustion engine disposed in a vehicle, the vehicle having a fuel tank coupled to a fuel filler tube, comprising: a carbon canister having a housing and activated charcoal within said housing, said carbon canister being in communication with the fuel tank such that fuel vapors in the fuel tank have access to said activated charcoal; and at least one conductive plate connected to an inside-surface of said housing, said conductive plate being in contact with said activated charcoal.  
 P'Xel 102

[c22] 22. The fuel vapor recovery system of claim 21 wherein said carbon canister is mounted in the fuel filler tube.

[c23] 23. The fuel vapor recovery system of claim 21, further comprising:  
 an inlet duct coupled to said carbon canister for conducting ambient air to said carbon canister;  
 a valve in said air inlet duct; and  
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an outlet duct coupled to said carbon canister for conducting ambient air and fuel vapors to the engine.

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